Continuing the separation of the combined tertiary bases from the roots of *Berberis oblonga* [1, 2], we have isolated a new phenolic alkaloid (I), which is amorphous, in the form of the iodide. λ_{max} ethanol 282 nm (log ε 3.87).

The mass spectrum of (I) has the peaks of ions with m/e 622 (M -- H), 608 (M -- CH₃), 417, 396, 395, 361, 198, 175, 174, 142, 127, and 58 (100%). Consequently, (I) is a monotertiary bisbenzylisoquinoline base containing a phenolic hydroxyl in the diphenyl oxide moiety [3, 4]. This is confirmed by the NMR spectrum of (I) taken in Py-d₅, which shows signals from N--CH₃, N(CH₃)₂, from three OCH₃ groups at 2.14 (3H, s), 3.20 (6H, s), 3.35 (6H, s), and 3.57 (3H, s), and from ten aromatic protons in the 6.35-7.10 ppm region.

The iodide (I) was methylated with diazomethane, giving a monomethyl ether (II) with mp 220-222°C (tetrahydrofuran). The mass spectrum of (II) had the peaks of ions with m/e 636 (M -- H), 622 (M -- CH₃), 607, 485, 431, 395, 381, 198, 175, 174, 142, 127, and 58 (100%). The ion with m/e 485 is formed by the ejection of ring E [5], which enables (I) to

![Fig. 1. Mass spectra of the monostilbene (V) (a) and the monostyrene (VI) (b).](image-url)
be assigned to the berbamine group. The NMR spectrum of (II) in CDC$_3$, shows signals from
N-CH$_3$, N(CH$_3$)$_2$, and four OCH$_3$ groups at (ppm) 2.15 (3H, s), 3.06 (3H, s), 3.31 (3H, s), 3.55
(3H, s), 3.72 (3H, s), and 3.82 (3H, s) and from ten aromatic protons in the 6.21-6.75 ppm
region.

To confirm that one of the nitrogen atoms in (II) and, correspondingly, in (I) is
quaternary, we performed the Hofmann degradation of (II). This yielded two des-bases: the
monostilbene derivative (V), amorphous, with a yield of ~60%, and the monostyrene derivative
(VI) with a yield of ~40%. In the mass spectrum of (V) (Fig. 1, a) the strongest peak is
that of the molecular ion with m/e 636, and there are ions with m/e 621 (M -- 15), 578 (M --
58), and 58, and also an ion with m/e 499 (M -- 137), which was formed by the ejection of
ring E. In this case, practically no ions formed by dibenzyl cleavage are observed. This
is in harmony with the monostilbene structure.

The mass spectrum of (VI) (Fig. 1b) shows the peak of M$^+$ (m/e 636) and ions formed by
dibenzyl cleavage (m/e 395 and 396) and by the ejection of ring E (m/e 499), and also in-
tensive ions with m/e 205 and 44, which characterizes (VI) as a monostyrene base.

Thus, (I) must be a monoquaternary derivative of berbamine or its diastereoisomer. To
decide this point, we obtained the methiodide (VII) of (II), the IR spectrum of which proved
to be identical with that of the dimethiodide of isotetrandrine (VIII). This defines the
configuration of the C-1 and C-1' azometric centers as RS. The choice between the two
structures (I) and (III) remains for (I).

Two monoquaternary derivatives of the berbamlne type have been described in the liter-
ature. The assignment of the signals in the NMR spectra of these bases and of tetrandrine,
isotetrandrine, and (II) are given below:

<table>
<thead>
<tr>
<th>Alkaloid</th>
<th>Absolute configuration</th>
<th>4'</th>
<th>6</th>
<th>6'</th>
<th>7</th>
<th>2'-N</th>
<th>2''-N</th>
<th>Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetrandrine*</td>
<td>SS</td>
<td>3.90</td>
<td>3.73</td>
<td>3.35</td>
<td>3.18</td>
<td>2.33</td>
<td>2.59</td>
<td>6</td>
</tr>
<tr>
<td>Cycleahomine chloride (IV)a</td>
<td>SS</td>
<td>3.94</td>
<td>3.72</td>
<td>3.38</td>
<td>3.30</td>
<td>3.30</td>
<td>3.48</td>
<td>3</td>
</tr>
<tr>
<td>2'-N-Methyltetrandrine (II)a</td>
<td>SS</td>
<td>3.91</td>
<td>3.74</td>
<td>3.41</td>
<td>3.26</td>
<td>2.34</td>
<td>3.91</td>
<td>3</td>
</tr>
<tr>
<td>Isotetrandrine</td>
<td>RS</td>
<td>3.55</td>
<td>3.78</td>
<td>3.63</td>
<td>3.18</td>
<td>2.28</td>
<td>2.60</td>
<td>6</td>
</tr>
<tr>
<td>2'-N-Methylisotetrandrine iodide (II)</td>
<td>RS</td>
<td>3.82</td>
<td>3.72</td>
<td>3.72</td>
<td>3.31</td>
<td>2.15</td>
<td>3.06</td>
<td>3</td>
</tr>
</tbody>
</table>

*The spectra of all the bases were taken in CDC$_3$.
†The assignment of the signals of the methoxy groups has
been made by ourselves.

Although the signals of the N-methyl groups in tetrandrine and isotetrandrine differed
by approximately 0.3 ppm, it is impossible to conclude that each of these groups is quater-
nary in cycleahomine chloride (IV) and 2'-N-methyltetrandrine (II), since the values of the
signals of the 2-N-CH$_3$ group in (IV) and the 2'-N-CH$_3$ group in (III) are very close. Con-
sequently, we were unable to make a choice between structures (I) and (III) on the basis of
the NMR spectrum.

For a definitive answer to this question we undertook the cleavage with sodium in liquid
ammonia of the monostilbene derivative (V). Under these circumstances, from the nonphenolic
moiety we isolated N-methylarmepavine (IX), which was identified by comparison with an
authentic sample, and from the phenolic moiety we isolated a base with (X) with mp 135-137°C
the mass spectrum of which showed the peaks of ions with m/e 315 (M$^+$), 270, 255, 223, 206,
107, and 58 (100%). The PMR spectrum taken in Py-d$_5$ showed signals from a N(CH$_3$)$_2$
group (2.82 ppm), an OCH$_3$ group (3.61 ppm), from benzyl protons (2.61-3.21 ppm), and from aromatic
protons (6.90-7.21 ppm). According to its spectral characteristics, the phenol (X) is di-
hydrode-N-methylcoclaurine. These facts permit the structure of 2'-N-methylberbamine (I)
to be assigned to the alkaloid isolated.